

CHECKLIST TO DESIGNATE AREAS OF EVALUATION FOR REQUESTS FOR PROPOSAL (RFP)

MDOT PROJECT MANAGER			JOB NUMBER (JN)	CONTROL SECTION (CS)
DESCRIPTION IF NO JN/CS				
MDOT PROJECT MANAGER: Check all items to be included in RFP. WHITE = REQUIRED GRAY SHADING = OPTIONAL Check the appropriate Tier in the box below			CONSULTANT: Provide only checked items below in proposal.	
TIER I (\$25,000-\$99,999)	TIER II (\$100,000-\$250,000)	TIER III (>\$250,000)		
			Understanding of Service	
			<i>Innovations</i>	
			<i>Safety Program</i>	
N/A			Organization Chart	
			Qualifications of Team	
			Past Performance	
Not required as part of official RFP	Not required as part of official RFP		Quality Assurance/Quality Control	
			Location. The percentage of work performed in Michigan will be used on all contracts unless the contract is for on-site inspection, then location should be scored for the on-site inspection.	
N/A	N/A		Presentation	
N/A	N/A		Technical Proposal (if Presentation is required)	
3 pages including cover sheet (No Resumes)	7 pages	19 pages	Total maximum pages for RFP not including key personnel resumes	

REQUEST FOR PROPOSAL

The Michigan Department of Transportation (MDOT) is seeking professional services for the project contained in the attached scope of services.

If your firm is interested in providing services, please indicate your interest by submitting a Proposal, Proposal/Bid Sheet or Bid Sheet as indicated below. The documents must be submitted in accordance with the latest "Consultant/Vendor Selection Guidelines for Service Contracts" and "Guideline for Completing a Low Bid Sheet(s)", if a low bid is involved as part of the selection process. **Referenced Guidelines are available on MDOT's website under Doing Business > Requests for Proposals.**

RFP SPECIFIC INFORMATION

BUREAU OF HIGHWAYS

BUREAU OF TRANSPORTATION PLANNING **

OTHER

THE SERVICE WAS POSTED ON THE ANTICIPATED QUARTERLY REQUESTS FOR PROPOSALS

NO

YES

DATED _____ THROUGH _____

Prequalified Services – See page ____ of the attached Scope of Services for required Prequalification Classifications.

Non-Prequalified Services - If selected, the vendor must make sure that current financial information, including labor rates, overhead computations, and financial statements, if overhead is not audited, is on file with MDOT's Office of Commission Audits. This information must be on file for the prime vendor and all sub vendors so that the contract will not be delayed.

Qualifications Based Selection – Use Consultant/Vendor Selection Guidelines

For all Qualifications Based Selections, the selection team will review the information submitted and will select the firm considered most qualified to perform the services based on the proposals. The selected vendor will be contacted to confirm capacity. Upon confirmation, that firm will be asked to prepare a priced proposal. Negotiations will be conducted with the firm selected.

**** For RFP's that originate in Bureau of Transportation Planning only**, a price proposal must be submitted at the same time as, but separate from, the proposal. Submit directly to the Contract Administrator/Selection Specialist, Bureau of Transportation Planning (**see address list, page 2**). The price proposal must be submitted in a sealed manila envelope, clearly marked in large red letters **"PRICE PROPOSAL – TO BE OPENED ONLY BY SELECTION SPECIALIST."** The vendor's name and return address **MUST** be on the front of the envelope. The price proposal will only be opened for the highest scoring proposal. Unopened price proposals will be returned to the

For a cost plus fixed fee contract, the selected vendor must have a cost accounting system to support a cost plus fixed fee contract. This type of system has a job-order cost accounting system for the recording and accumulation of costs incurred under its contracts. Each project is assigned a job number so that costs may be segregated and accumulated in the vendor's job-order accounting system.

Qualifications Review / Low Bid - Use Consultant/Vendor Selection Guidelines. See Bid Sheet Instructions for additional information.

For Qualification Review/Low Bid selections, the selection team will review the proposals submitted and post the date of the bid opening on the MDOT website. The notification will be posted at least two business days prior to the bid opening. Only bids from vendors that meet proposal requirements will be opened. The vendor with the lowest bid will be selected. The selected vendor may be contacted to confirm capacity.

Best Value - Use Consultant/Vendor Selection Guidelines. See Bid Sheet Instructions below for additional information. The bid amount is a component of the total proposal score, not the determining factor of the selection.

Low Bid (no qualifications review required - no proposal required.) See Bid Sheet Instructions below for additional instructions.

BID SHEET INSTRUCTIONS

A bid sheet(s) must be submitted in accordance with the "Guideline for Completing a Low Bid Sheet(s)" (available on MDOT's website). The Bid Sheet is located at the end of the Scope of Services. Submit bid sheet(s) separate from the proposal, to the address indicated below. The bid sheet(s) must be submitted in a sealed manila envelope, clearly marked in large red letters **"SEALED BID – TO BE OPENED ONLY BY SELECTION SPECIALIST."** The vendor's name and return address **MUST** be on the front of the envelope. Failure to comply with this procedure may result in your bid being opened erroneously by the mail room.

PROPOSAL SUBMITTAL INFORMATION

REQUIRED NUMBER OF COPIES FOR PROJECT MANAGER	PROPOSAL DUE DATE	TIME DUE
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PROPOSAL AND BID SHEET MAILING ADDRESSES

Mail the multiple proposal bundle to the MDOT Project Manager or Other indicated below.

MDOT Project Manager

MDOT Other

Mail one additional stapled copy of the proposal to the Lansing Office indicated below.

Lansing Regular Mail	OR	Lansing Overnight Mail
Secretary, Contract Services Div - B225 Michigan Department of Transportation PO Box 30050 Lansing, MI 48909		Secretary, Contract Services Div - B225 Michigan Department of Transportation 425 W. Ottawa Lansing, MI 48933
Contract Administrator/Selection Specialist Bureau of Transportation Planning B340 Michigan Department of Transportation PO Box 30050 Lansing, MI 48909		Contract Administrator/Selection Specialist Bureau of Transportation Planning B340 Michigan Department of Transportation 425 W. Ottawa Lansing, MI 48933

GENERAL INFORMATION

Any questions relative to the scope of services must be submitted by e-mail to the MDOT Project Manager. Questions must be received by the Project Manager at least four (4) working days prior to the due date and time specified above. All questions and answers will be placed on the MDOT website as soon as possible after receipt of the questions, and at least three (3) days prior to the RFP due date deadline. The names of vendors submitting questions will not be disclosed.

MDOT is an equal opportunity employer and MDOT DBE firms are encouraged to apply. The participating DBE firm, as currently certified by MDOT's Office of Equal Opportunity, shall be listed in the Proposal

MDOT FORMS REQUIRED AS PART OF PROPOSAL SUBMISSION

5100D – Request for Proposal Cover Sheet

5100G – Certification of Availability of Key Personnel

(These forms are not included in the proposal maximum page count.)

Michigan Department of Transportation

SCOPE OF SERVICE FOR “AS NEEDED” DESIGN SERVICES

Lansing Design Support Area Survey Unit

CONTROL SECTION: Various

JOB NUMBER: Various (see list below)

WORK DESCRIPTION: The Consultant will be expected to provide experienced personnel for Design Survey services on an as needed basis for MDOT design projects. Such tasks would include but may not be limited to work in the following areas of survey: Road Design Survey, Hydraulics Survey, Structure Survey, Photogrammetric Ground Control Survey and ROW Survey.

PRIMARY PREQUALIFICATION CLASSIFICATION:

Photogrammetric Ground Control Survey, PPMS Task 3320

Road Design Survey, PPMS Task 3330

Structure Survey, PPMS Task 3340

Hydraulics Survey, PPMS Task 3350

Right-of-Way Survey, PPMS Task 4510

DBE PARTICIPATION:

This Scope of Services has an 0% DBE qualification.

POTENTIAL SURVEY PROJECTS:

JN: 50800D CS: 39014 STRUCTURE: S01
JN: 83617D CS: 39031 STRUCTURE: B01
JN: 83556D CS: 08052 STRUCTURE: B06
JN: 83043D CS: 82062 STRUCTURE: B02
JN: 74747D CS: 38131 STRUCTURE: S01
JN: 75091D CS: 41024 STRUCTURE: R01-3 & 4
JN: 83547D CS: 12041 STRUCTURE: B01
JN: 49944D CS: 19031 STRUCTURE: B07
JN: 78967D CS: 58151 STRUCTURE: S01
JN: 83954D CS: 63998 STRUCTURE: R01
JN: 83574D CS: 80011 STRUCTURE: B04
JN: 79897C CS: 47013 ROUTE: US-23
JN: 79671C CS: 81012 ROUTE: M-52
JN: 79594C CS: 20012 ROUTE: I-75BL
JN: 86206C CS: 11013 ROUTE: I-94BL

MDOT reserves the right to request surveying services on other projects located in the State that are not listed above under the terms and conditions of this Scope of Services for Consultant “As Needed” Design Survey Services.

MDOT TEAM:

Any questions regarding this Scope of Survey Services may be directed to the MDOT Survey Project Manager: Thomas Benson, 517-373-0020, bensont2@michigan.gov, or via the mail system at the following address.

Michigan Department of Transportation
Van Wagoner Building
425 W. Ottawa Street, B220
P.O. Box 30050
Lansing, MI 48909

GENERAL DESCRIPTION OF PROCESS:

Full time services will not be required on all projects at all times. This contract is for “as needed” services, based on the intermittent needs of the MDOT Lansing Design Survey Unit. It must be noted that a consultant award under this contract is not a guarantee of consultant Authorization.

The MDOT Lansing Design Survey Project Manager / Consultant Coordinator will contact the Consultant for specific services through a **Request for Consultant Survey Staff Letter**, Attachment C of this Scope of Services, stating the MDOT job number and control section, route, survey services needed, the project duration, and a timeframe in which the work shall be required for completion. The Consultant will then review this request and inform MDOT of their availability and willingness to work on this project, as well as the names of the Consultant’s personnel chosen to work on the project within two days of receiving the Request for Consultant’s Survey Staff. An estimated cost will also be submitted to MDOT prior to the Consultant beginning work. Every attempt will be made to submit requests at least one week prior to the need for personnel. If the Consultant accepts the MDOT work assignment a meeting will be set up between MDOT and the Consultant to review the information in the Request for Consultant Survey Staff Letter and the Consultant’s proposal and personnel.

The Consultant will need to get approval of the MDOT Lansing Design Survey Project Manager prior to continuing work on an individual job in which the Consultant’s billable costs exceeds 7% of the estimated cost of the project. If the Consultant does not get approval for this over amount, the Consultant will be working at own risk.

The MDOT reserves the right to grant final work authorization based on the Consultant’s understanding of the specific survey project tasks and personnel. If the Consultant is unable to fulfill a request MDOT may utilize a different Consultant awarded under this

As Needed Scope for Consultant Survey Services. There will be a total of four (4) Consultant awards under this As Needed Scope for Consultant Survey Services.

This contract will cover “as needed” services for a period of 1 year from date of initial Authorization. Each of the 4 selected firms may receive an Authorization rotationally on a per project basis. The consultant may work on an “as needed” basis for up to \$250,000 provided the consultant has performed adequately on the previous project. A Consultant may not work on any more than one (1) “as needed” job at any given time, unless directed by the MDOT Lansing Design Survey Project Manager.

PAYMENT SCHEDULE

Compensation for this Scope of Services shall be on an actual cost plus fixed fee basis.

CONSULTANT PAYMENT

All invoices/bills for services must be directed to the Department and follow the 'then current' guidelines. The latest copy of the "Professional Engineering Service Reimbursement Guidelines for Bureau of Highways" is available on MDOT's Public Web site under Doing Business/File Libraries/OCSCONS, **invguide.pdf**. This document contains instructions and forms that must be followed and used for invoicing/billing; payment may be delayed or decreased if the instructions are not followed. The Consultant must refer to the MDOT Job Number on the invoice when submitting invoices for payment by the Department for an “as needed” job.

Payment to the Consultant for Services rendered shall not exceed the "Cost Plus Fixed Fee Not to Exceed Maximum Amount" unless an increase is approved in accordance with the contract with the Consultant. All invoices/bills must be submitted within 14 calendar days of the last date of services for the “as needed” job being performed for that invoice.

This scope is for “as-needed” services, as such, the hours provided are only an estimate. The Consultant will be reimbursed a proportionate share of the fixed fee based on the portion of these hours in which services have been provided to the Department. The fixed fee allowed for this project will be 11.0%.

Direct expenses will not be paid in excess of that allowed by the Department for its own employees. Supporting documentation must be submitted, with the invoice/bill, for all billable expenses on the Project. **The only hours that will be considered allowable charges for this contract are those that are directly attributable to the surveying activities of a specific project. Hours spent in administrative, clerical, or accounting tasks for billing and support are not considered allowable hours; there will be no reimbursement for these hours.**

There will be no reimbursement for overtime hours unless specified in advance in writing by the MDOT Project Manager.

MONTHLY PROGRESS REPORT

On the first day of each month, the Consultant shall submit a monthly project progress report to the MDOT Project Manager. The monthly progress report shall address the following items:

1. Work accomplished during the previous month.
2. Anticipated work and goals for the coming month.
3. Real problems which occurred during the month, and anticipated problems for the coming month.
4. Any updates on the project schedule including explanations for any delays or changes in schedule, scope, or work plan.
5. Any early reviews or submittals such as adjustments, computations, or alignment.

GENERAL REQUIREMENTS:

1. Surveys must comply with **all Michigan law** relative to land surveying.
2. Surveys must be done under the **direct supervision** of a Professional Surveyor licensed to practice in the State of Michigan.
3. Work in any of the following categories of survey: Road Design, Structure, Hydraulic, Right-of-Way, Ground Control (Photogrammetric), and/or Geodetic control, must be completed by a survey firm which is pre-qualified by MDOT.
4. Surveys must meet all requirements of the Michigan Department of Transportation (MDOT) Design Surveys *Standards of Practice* dated March, 2006. Please contact the Design Survey office to clarify any specific questions regarding these standards.
5. The Consultant is responsible for using the latest MDOT CAiCE Feature Codes, files and tugboat (macro), available on the MDOT File Transfer Protocol (FTP) site. **The CAiCE software used must be Version 10.2 or newer. The Consultant must also use MicroStation Version 8.**
6. Consultants must obtain all necessary permits required to perform this survey on any public and/or private property. This includes an up-to-date permit from the MDOT Utilities Coordination and Permits Section
7. Prior to performing the survey, the Consultant must contact all landowners upon

whose lands they will enter. The contact may be personal, phone or letter, but must be documented. This notice must include the reasons for the survey on private land, the approximate time the survey is to take place, the extent of the survey including potential brush cutting, and an MDOT contact person (the MDOT project manager).

8. The Consultant must contact any and all Railroads prior to commencing field survey on railroad property. The cost for any permit, flaggers and/or training that is required by the Railroad will be considered as a direct cost, but only if included in the Consultant's proposal.
9. The Consultant must adhere to all applicable OSHA and MIOSHA safety standards, including the appropriate traffic signs for the activities and conditions for this job.
10. Consultants are responsible for a comprehensive and conscientious research of all records, including MDOT records, essential for the completion of this project.
11. Measurements, stationing, recorded data, and computations must be in **International Feet**.
12. Coordinate values must be based on the Michigan Coordinate System of 1983 (MCS 83), Appropriate Zone. All elevations must be based on the North American Vertical Datum of 1988 (NAVD88).
13. For a **Road Design Survey**, **three complete sets of survey notes** must be submitted to the Design Survey Unit in 10" by 12" divided portfolios with flap covers. For a **Structure Survey**, **two** complete sets must be submitted. As many portfolios should be used as are needed to contain all of the required documents and Compact Discs.
14. Each portfolio must be labeled on the outside as in the following example:

Survey Notes for:
Route, Location and Project Limits [I-94, 11 Mile Road to 171/2 Mile Road]
Control Section [13082] Job Number [74956C]
By [*Name of Firm*]
Michigan Professional Surveyor [] License # []
15. Each submittal is to be divided into six sections. These sections are to be labeled as follows: **Administrative, Alignment, Control, Property, Mapping, and Miscellaneous**.
 - a. The **Administrative** section will include the following items: a completed copy of the MDOT Form 222(5/01) entitled "SURVEY NOTES: RECEIPT AND TRANSMITTAL"; the limits of the survey and original survey scope as

determined by the Consultant Surveyor and Design Engineer; a complete synopsis of the survey **that shall include, but not be limited to** horizontal and vertical control datums used, methodology, a complete discussion of government corners recovered, perpetuated or otherwise used as part of the survey, problems encountered, and a statement from the Consultant surveyor supervising the project certifying compliance with Michigan Department of Transportation (MDOT) Design Surveys *Standards of Practice* dated March, 2006; as well as documentation of all project specific meetings and/or conversations with MDOT Survey personnel.

Also included in the Administrative section shall be a copy of the **Survey Project QA/QC Check-off list**, a copy of which is included as Attachment “B” of this scope. This document shall be signed and certified by the Professional Surveyor responsible for the project. It is highly recommended that the consultant become familiar with this document prior to preparing the proposal and again prior to assembling the final portfolio. **Failure to use and include this document shall result in the immediate return of the project portfolio for completion.**

- b. The **Alignment** section will contain a sketch of the alignment, witnesses and stationing of alignment points set or found; an explanation of how the alignment was determined, whether as-constructed (best fit) or legal; and all supporting documentation.
- c. The **Control** section must contain the data collected and copies of all research documents used to establish the **horizontal and vertical** reference systems for the project, and must include a thorough written explanation describing how the systems were established. This section should also contain control traverse and GPS raw data (electronic), least squares analysis for both traverse and benchmarks, and a list of control point coordinates and witnesses. A complete benchmark list with datum, description, station and offset, and elevation shall also be included. This information must be submitted in hardcopy as well as ASCII and MicroStation electronic file format on Compact Discs (CD’s). Also, a sketch of the control traverse, showing any ties (government corners, property, alignment, etc.) shall be included in this section.
- d. The **Property** section contains all information that is utilized regarding the real property affected by the project, and all necessary property ties. This may include copies of all recorded Land Corner Recordation Certificates for the government corners used or reestablished, recorded plats, recorded certified surveys, tax maps, tax descriptions, and adjacent/riparian owners.
- e. The **Mapping** section contains all survey notes, research documents, and collected data used to produce the maps necessary for this project. All topographic plots, as well as utilities and drainage information, are to be placed in this section.

- f. The **Miscellaneous** section contains any information not included in the previous sections. The project Surveyor's Report should specify any items included in this section.
16. All data, whether electronic or paper, must be recorded on non-rewritable Compact Discs (CD's). All paper files, including MicroStation files, must be scanned and/or converted to Adobe Acrobat .PDF format. CD's must be organized in the same manner as the portfolio, such as by Administrative section, Control section, etc. A Table of Contents in Adobe Acrobat format is required that has all .PDF pages of the CD bookmarked/linked so each place in the .PDF archive can be accessed with a single click of the computer mouse. Specified format files such as ASCII text, CAiCE and MicroStation must have separate access.
- CD's must be labeled with the route, location, control section, job number, Consultant name, and data type.**
17. Each category of survey must be packaged separately (i.e., Structure survey separate from Road survey). All sheets in a portfolio must be marked with the control section, job number, portfolio section name, and page number.
18. The Consultant representative shall record and submit typewritten minutes for all project related meetings to the MDOT Project Manager within two weeks of the meeting. The Consultant shall also distribute the minutes to all meeting attendees.
19. The MDOT Project Manager is the official contact for the Consultant. The Consultant must either address, or send a copy of all correspondence to the MDOT Project Manager. The MDOT Project Manager shall be made aware of all communications regarding this project. Any questions regarding this award or any subsequent project should be directed to the Design Survey Consultant Coordinator and Project Manager, Thomas Benson, at 517-373-0020, or e-mail bensont2@michigan.gov.

At the completion of this survey, all field survey notes (legible copies will suffice), all electronic data, and all research records obtained for this project will be considered the property of MDOT and must be sent to: MDOT, Design Division, Consultant Coordinator / Survey Project Manager, P.O. Box 30050, Lansing, MI 48909. Please use MDOT's Form 222 entitled "SURVEY NOTES: RECEIPT AND TRANSMITTAL" for all transmittals.

NOTE: It is recommended that the project's horizontal and vertical control adjustments be submitted for review as soon as it is available.

WORK RESTRICTIONS

The Consultant must notify the closest MDOT Transportation Service Center Traffic & Safety Engineer prior to submitting a priced proposal and prior to beginning work activities in the project area.

The MDOT TSC Traffic & Safety Engineer must be notified at least two weeks prior to lane closures so advance notice can be posted on the Web site.

No work shall be performed or lane closures allowed during the Memorial Day, Independence Day, or Labor Day holiday periods. The Memorial Day and Labor Day holiday periods are defined as beginning on Thursday at 6:00 PM until normal starting time on Tuesday. The Independence Day holiday period is defined as beginning on Monday, July 2nd at 7:00 AM and continuing until Friday, July 6th at 5:00 PM.

Traffic shall be maintained by the Consultant throughout the project in accordance with Sections 812, 922, 103.05 and 103.06 of the *Standard Specifications for Construction*, 2003 edition, www.mdot.state.mi.us/specbook/, and Supplemental Specification 03SS001(2) Errata to the 2003 Standard Specifications and all other supplemental specifications currently in effect against the Standard Specifications for Construction. All traffic control devices shall conform to the current edition, as revised, of the *Michigan Manual of Uniform Traffic Control Devices* (MMUTCD). All warning signs for maintenance of traffic used on this project shall be fabricated with prismatic retro-reflective sheeting.

The Consultant shall use MDOT standard “maintaining traffic” typicals for any and all closures. Typical MDOT traffic control diagrams are available on line at www.mdot.state.mi.us/tands/plans.cfm

FIELD SURVEY

The purpose of a field survey is to obtain information and/or data required by / for the project design engineer, to leave horizontal and vertical control in the field for future construction staking, and to provide a sufficient history of the area to enable the MDOT Design Survey Unit to perform dependable surveys in the future.

The field survey must include, but is not limited to, the following: Each area below will be discussed for each job. The Consultant will know the scope for each “as needed” project.

ALIGNMENT

A legal alignment may need to be established for any project. Establishing the plan centerline alignment determines the legal limit of the right-of-way as defined by and described from its centerline. Right-of-way plans, previous construction plans, existing monumentation, physical centerline both present and underlying, and other recorded information are to be used as guides to the proper location of the legal centerline. All evidence must be evaluated to determine the legal alignment. The method used to

establish this alignment must be clearly explained in the surveyor's project report. All data used to determine the alignment, as well as a sketch of the alignment, must be included in the submitted survey notes. This alignment, with the stationing marked and labeled, is to be shown on the topographic map submitted for this project. All measured angles, distances, and curve data must also be reported where applicable. Alignments of all side streets must be tied to the project legal alignment.

At least two alignment control points must be found or set and witnessed on each tangent. These points must be intervisible and not be more than 3,000 feet apart. The alignment points may be set on an offset to the true alignment. If this is done, the witnesses must include the offset distance and the project surveyor must certify that the line is a true parallel offset. The project surveyor must provide a sufficient number of primary and intermediate control points to allow staking of the computed alignment without additional traversing by construction survey crews. The alignment notes must include the state plane coordinates and at least four witnesses for each alignment control point set or found.

The consultant must include a sketch or CADD drawing of the alignment in the portfolio, showing stationing, horizontal coordinates, curve data (Radius, External, Tangent length, PC station, PI station and PT station), alignment points found or set, and the basis from which the project stationing was determined.

The Consultant must use the MDOT Feature Code of SCL for the alignment chains.

CONTROL

HORIZONTAL CONTROL

A three dimensional coordinate system must be established based on the North American Datum of 1983, NAD83 (CORS), Michigan State Plane Coordinates in international feet units for this project. The horizontal least squares adjustment statistics must be reported at the 95% confidence level.

Upon request, the MDOT Design Survey Unit will supply descriptions of nearby published National Geodetic Survey (NGS) control stations and benchmarks. A complete history, as well as a recovery description with new witnesses to be submitted in DDPROC to NGS, for each NGS station and bench mark **used and/or searched** for this project must be included in the final report submitted to the MDOT Design Survey Unit. The DDPROC program is available through the MDOT Design Survey office. The Consultant may opt to use the Mark Recovery Entry Form on the NGS Website, www.ngs.noaa.gov. If this is done, a printed copy must be submitted with the portfolio.

The horizontal project control for this project will be classified as Intermediate project control according to the MDOT Standards of Practice dated March 2006. These control points are intended for mapping and should be located outside the proposed construction area to insure their availability for all phases of construction. Each control point must be accurately described and witnessed to at least four nearby features. Please refer to

MDOT Standards of Practice for the minimum requirements for these points.

A closed traverse must be run and adjusted between two or more known points on the project control traverse. Open traverses are NOT acceptable. Unadjusted traverse measurements must produce an error of closure of not greater than 1:20,000. Any permissible error of closure shall be distributed throughout the traverse by means of a suitable least squares adjustment software program. These points must not be set greater than 1320 ft nor less than 450 ft apart, semi-permanent in nature, and located outside the proposed construction area to insure their availability for all phases of construction. All data collection traverse points and the plan centerline alignment must be tied to the control established for this project.

All field observations, unadjusted traverse computations and final adjusted coordinates must be included in the notes. A **list of all horizontal control points** must be developed which includes datum, point designations, descriptions, horizontal coordinates with standard errors, station and offset, witnesses and combined scale factors. This list must also provide a formula for a grid to ground conversion. **This list must be generated in ASCII format, without tabs, as shown in Attachment A.** A Microsoft Word file format, with tabs, is also acceptable (for importation through the MicroStation-Axiom-Microsoft Office Importer), as long as it maintains the integrity of the form shown in Attachment A. This list must be printed on 8.5" x 11" sheets and placed on CD. All data relating to the horizontal component of the system must be included in the control section of the portfolio.

When using GPS techniques to obtain coordinates on either Primary or Intermediate Control points, two of the following three methods must be used:

- A minimally constrained CORS solution
- An OPUS solution with at least 2 hours of occupation per point. For any and all OPUS solutions, a RINEX format file with a minimum of two hours of GPS data must be included, as well as the OPUS solution from NGS. All OPUS solutions must be verified within 0.20 foot, either by a separate OPUS position from an independent occupation, or by a NGS/CORS adjustment.
- The procedure outlined in Section 7.2.1 of the MDOT Survey Manual.

Open radial vectors are not acceptable.

Unadjusted network vector measurements must produce an error of closure of not greater than 1:100,000 for primary control and 1:20,000 for intermediate control. Any permissible error of closure shall be distributed throughout the network by means of a suitable least squares adjustment software program. The difference in global location between the two chosen methods must not exceed 0.20 feet (0.0610 m). A narrative explaining the process and errors must be included in the Surveyor's Report.

Use of RTK GPS mapping methods needs to be discussed with the Survey Project Manager prior to the beginning of any project.

VERTICAL CONTROL

The vertical component of this project must be based upon the North America Vertical Datum of 1988 (NAVD 88). The vertical least squares adjustment statistics must be reported at the 95% confidence level.

Upon request, the MDOT Design Survey Unit will supply descriptions of nearby published NGS control bench marks.

New bench marks must be set on massive structures outside the proposed construction area. Each bench mark must be accurately described and its horizontal position referenced by measurement from a horizontal control point and by station plus and offset from the alignment stationing.

Intermediate Vertical Control for project bench marks shall meet an unadjusted error of closure between known bench marks of not more than 0.05 ft times the square root of the distance in miles (Third Order leveling accuracy standards). Any error of closure must be distributed throughout the level runs by means of a suitable least squares adjustment software program. Open level loops are NOT acceptable.

The bench mark notes must include all field observations, the unadjusted loop closures and the final adjusted elevations. A **bench mark list** must be developed that includes datum, bench mark designations, descriptions, elevations, and station and offset (left or right) out from centerline. **This list must be generated in ASCII format, without tabs, as shown in Attachment A.** This bench mark list must be printed on 8.5"x 11 sheets and placed on CD. All data relating to the vertical component of the system must be included in the control section of the portfolio.

The methods used to establish the horizontal and vertical components of the project coordinate control system must be fully discussed in the Surveyor's Project Report.

PROPERTY

GOVERNMENT CORNERS

Any Public Land Survey System (PLSS) corners within the project construction limits must be recovered or established and tied to the project coordinate system. Any PLSS corners needed to establish the alignment are required (**if legal centerline is required**), as are any PLSS corners in danger of obliteration by impending road construction.

All PLSS corners must be verified to the Professional Surveyor's satisfaction and recorded in accordance with PA 74 of 1970, as amended, and all applicable administrative rules. Four valid witnesses must exist in the field, or a new LCRC with four valid witnesses must be filed. A copy of each **recorded** Land Corner Recordation Certificate must be

submitted to the MDOT Design Survey Office as part of the final report.

All PLSS corners located in hard surface roads must be protected by a monument box, regardless of impending construction. It shall be the responsibility of the Project Surveyor to coordinate all such activities with the County Remonumentation Representative(s).

MAPPING

Project deliverables will include an Intergraph MicroStation V8(.DGN) format 2D planimetric map for the area within the mapping limits in both hardcopy and electronic format, a corresponding three dimensional MicroStation V8 (.DGN) triangle file and Geopak (.ALI), (.XYZ) and (.OBS) files along with a fully edited CAiCE archive (.zip) file. These files must be created with the current MDOT English seed and cell files. Current MDOT symbology must be used exclusively as shown on the MDOT FTP site.

The FTP site for consultants is:

<ftp://ftp.michtrans.net>

username: survcons

password: \$urvcon\$

Survey data shall be displayed, with the appropriate descriptive attributes, Microstation levels, size of text, etc. as noted in on the FTP site. This information if requested can be given to the selected consultant.

Mapping Scale: AS NEEDED TO FACILITATE THE PROPOSED DESIGN

The Consultant is required to use the latest MDOT Tugboat (macro) to produce the final project deliverables.

The surveyor or CAiCE/CADD technician is expected to use due judgment in the event of necessary deviations from this standard. Survey chains (line items) will be processed and edited so as to be displayed as lines and smooth curves as appropriate and displayed at the requested scale with the appropriate pattern. All descriptive text shall be arranged such that text shall not overwrite each other. The delivered product should be legible and professional in appearance and portray an accurate representation of existing field conditions. As there are many variations in standard practices throughout the industry, it is recommended that the consultant refer to the MDOT FTP site and the MDOT Design Division Plans Preparation Guidelines for additional information regarding such things as font size, display attributes, symbology, levels, etc., to be displayed in the submitted planimetric file. Questions or confusion should be immediately brought to the attention of the MDOT Project Manager for clarification.

Tree descriptions shall differentiate deciduous from coniferous and include trunk diameter, in inches, 4 ft above the ground; Culvert type, size in inches and flowline

elevation; Brush and wooded areas should be outlined and classified as to average size and density as noted in the attached appendix. Additional information that should be noted is surface materials, changes in surface materials, curb detail (profile type), ditch type (e.g. 2 ft round bottom), contours on the appropriate level and interval, building or mailbox addresses and other noteworthy items. This information may be included on the CADD file (on the proper level), or handwritten on a field verification plot. The plots will be submitted as described under the section of “Final Reports”.

A Digital Terrain Model (DTM) will be created from the appropriate terrain data using the CAICE terrain modeling format. It shall be checked for accuracy and edited as necessary to provide a true representation of the existing terrain. All triangles in the triangulation network that fall outside of the limits of this survey, or are deemed inappropriate in the judgment of the surveyor, are to be obscured so as to have no effect on cross-sections, contours and profiles developed from the model. These would include triangles which have legs so long as to cross areas that contain no survey data. Contours are to be generated from the Digital Terrain Model (DTM), to depict the site conditions for this project and plotted as noted above.

A statement, similar to the following, must be affixed to each sheet of all plots which certifies to the map’s accuracy and signed and sealed by the project surveyor:

I hereby certify that this map has been developed from survey data collected, and that accuracy standards are in accordance with the MDOT Design Survey Standards. This map correctly represents the existing conditions at the time the survey was completed.

All plots must be clearly defined and legible. An illegible plot will not be acceptable.

UTILITIES

All surface manifestations of utilities within the project area must be identified and their location tied to the project’s horizontal coordinate system. A list of all utilities within the project limits must be submitted on CD as well as on a printed list. This list must include the feature name of each utility, its horizontal coordinates and elevation, and station and offset. A CAICE station and offset report will satisfy this requirement.

DRAINAGE

The consulting firm is required to contact all local officials necessary to obtain all surface and subsurface drainage information regarding the project. The Consultant must also ask the local officials about any known drainage problems within the project area and report their findings, as well as any observed drainage problems in a separate drainage report.

The following information is required for all surface and subsurface drainage:

- The type, size, condition, location, station, offset, surface and bottom

or invert elevation of each drainage structure and culvert. This information must be printed on 8.5" x 11" sheets and submitted on CD in ASCII or spreadsheet format.

- Descriptions of underground drainage structures shall include: description and type of structure, type of system (storm, sanitary, etc.), description or type of structure cover, size, type, invert elevation and direction of each pipe leading into or out of the structure.
- Culvert descriptions shall include size, type, invert elevation and end section treatment. Condition of culvert should include: horizontal and vertical misalignment, visible damage, rust, infiltration and amount by which it is filled with dirt and debris, if any.
- The location of all catch basins, manholes, and cross culverts must be shown on the topographic map. It may be necessary to prepare a separate plot to clearly show the surface drainage systems. Underground sanitary and storm systems must be mapped to show the connectivity of the structures. This may be added to the CADD file or hand sketched and submitted on a separate topographic plot made specifically for this purpose.

All plans and maps obtained from local officials are to be submitted as part of the final report. Information regarding any drainage problems from local officials, residents, or the consultant's observations must be documented in a separate drainage report.

This section will contain sections for all topography, elevations, surface/subsurface utility locations, and surface/subsurface drainage, including all cross culverts.

MISCELLANEOUS

Any information that would not be appropriately placed in the control, property or mapping sections should be included in this section. General photographs, local newspaper articles and project-related comments from residents are examples of miscellaneous data.

The surveyor must describe, in the final report, the data included in this section.

FINAL REPORT: One complete portfolio and three complete sets of CD's or DVD's

The final report for this project shall include the following:

In the first pocket of the portfolio (Administrative):

MDOT's Form 222 entitled "SURVEY NOTES: RECEIPT AND TRANSMITTAL"

MDOT QA/QC Check-off sheet, completed, signed and sealed.

QA/QC Certification as detailed in the March 2006 Standards of Practice.

The project's Professional Surveyor's Report on company letterhead consisting of the following:

A comprehensive synopsis, signed by the project's Professional Surveyor, of the work performed on this project.

The source and the methods used to establish the project horizontal control, elevations, alignment(s) and stationing for this project.

A detailed explanation of anything discovered during the survey that may create a problem or be of interest to for the design engineer or another surveyor.

MDOT authorization letter

Copy of the scope of work

Copy of proposed work schedule

Any correspondence (change of scope, change of schedule, records of phone conversations, etc.)

All Project files archived on DVD's or Compact Disc (CD's) including:

CAiCE archive (.zip) with digital terrain model (DTM) that has been appropriately edited and verified.

A MicroStation drawing file (.DGN). The format for the drawing file shall conform to all MDOT drafting standards pertaining to working units, global origin, features display, level assignments, standard line weights and colors, standard text assignments, standard fonts, and MDOT cell library assignments as listed in listed on the MDOT consultant FTP site.

All required ASCII files or WordPerfect documents, reports, lists, etc.

A PDF file of the project as detailed in the March 2006 Standards of Practice.

In the second pocket (Control):

Least squares adjustments for the horizontal and vertical control: GPS./traverse adjustment showing the standard errors; level adjustment report showing the foot error per mile.

Control Point witness list with datum, point number, coordinates with Std. Errors, witnesses, station-offsets and appropriate scale factors.

Benchmark List with datum, descriptions, elevations, station-offsets.

GPS./traverse adjusted coordinates with standard errors.

Sketch or plot of network or traverse.

NGS or MDOT data sheets of existing control and benchmarks

DDPROC - .ha files printout, or printout of search submittal to NGS

In the third pocket (Alignment):

A sketch or CADD drawing of the alignment with stationing, horizontal coordinates, curve data, alignment points found or set, and a station equation to existing stationing in feet. The drawing shall also include a certification as detailed in the March 2006 Standards of Practice.

Control sketch with control points, government corners and alignment plotted.

A report discussing in detail the type of alignment and how it was determined.

The witness list with description and coordinates for the alignment points found or set.

In the fourth pocket (Property):

Recorded copies of all LCRCs used for the project

Government Corner list with Corner names, Coordinates and 4 witnesses. This list should clearly indicate which corners are in danger of destruction due to impending construction.

Section Corner ties to the alignment with station, distance and bearing along the section line.

Section map with bearings, distances between Government corners.

Copy of submittals to county Remonumentation (if required)

Copies of all research documents, tax maps, tax descriptions, deeds, recorded plats, surveys, etc.

A separate plot of alignment showing all property irons found.

A station-offset listing of property irons.

In the fifth pocket (Mapping):

A legible planimetric plot, including contours, of this project on the required sheet size and utilizing the most recent MDOT Design Division Feature Codes and Cell Library. Please refer to “FTP site” for Feature Code display criteria. The centerline alignment(s) must be shown on this plot.

A second planimetric plot that shall legibly show all surface materials, utility connectivity and other pertinent notes or comments.

The consultant is responsible for verifying all plots by a field inspection. Each plotted sheet must have the statement as specified in the Standards of Practice for MDOT Design Surveys dated March 2006 affixed to it. Each sheet must also be signed and sealed by a Professional Surveyor licensed in the State of Michigan which certifies to the accuracy of the plots.

All field survey notes, all electronic data, and all research records obtained for this project. It is not necessary to submit raw survey data in hardcopy form, electronic format will suffice.

Drainage structure inventory that shall be correlated to the structures shown on the planimetric map and will include all pertinent data about the structures: Station and offset, coordinates, structure name, rim elevations, invert depths with corresponding computed invert elevation, pipe sizes, directions, structure cover type, complete culvert information, etc.

Drainage Report.

Legible copies of the plans for all utilities located within the limits of this project, and a list of all utilities with installations within the project area, noting utility name, address, phone number and contact person.

In the sixth pocket (Miscellaneous):

Field books - numbered and marked with CS, JN, date

Miscellaneous documents such as newspaper articles, general correspondence.

Any reports or materials pertinent to the project not included in the other sections of the portfolio.

It is the responsibility of the consultant to insure that all electronic files submitted

to MDOT conform to the required format, and that all documents are legible.

The Consultant must organize and label the various sections of the portfolio as required by the Standards of Practice for MDOT Design Surveys dated March 2006.

ATTACHMENT “A”

Formats for control point lists, benchmark lists, alignment point lists, and Government corner witness lists. This formatting is required to import the lists in to the MicroStation drawing.

1. ASCII files must be generated exclusively in ASCII Text format, in a program such as Notepad. Conversions from Rich Text Format, Word, etc. are not acceptable unless the file can be imported directly into MicroStation in proper form (see #6 below).
2. Do not use Tabs to align text. Use spaces only.
3. Use normal keyboard keys for fractions. (Example ½)
4. For Special characters use only the following ASCII characters for conversion to MicroStation:

+/- = ± (plus or minus)

CL = Centerline

dia = ø (diameter)

^ = ° (degree)

5. A Microsoft Word file format, with tabs, is also acceptable for importation through the MicroStation-Axiom-Microsoft Office Importer, as long as it maintains the integrity of the form shown in #6 below. Holding the ALT key down while typing 248 produces the degree symbol.
6. Data must be organized as shown in the example below:

CONTROL PT#: CP660

DESCRIPTION: Set 5/8 in. x 3 ft re-rod and yellow S&W cap in West edge of M-95 gravel shoulder, and +/- 150 ft. North of CL of Norway Dr.

Station 47+38.27, Offset 20.02 ft. Lt

COORDINATES: N = 409,047.647 E = 13,232,571.566 Elev = 892.864

Combined Scale Factor: 0.999967411155

WITNESSES:

- | | | |
|----------|----------|---|
| 1. East | 19.4 ft. | CL of N-S concrete M-95 |
| 2. South | 6.0 ft. | North edge of concrete base of City Limits sign |
| 3. S84°W | 16.8 ft. | Set nail and S&W tag in North face of power pole |
| 4. S43°E | 73.8 ft | Set nail and S&W tag in S.W. face of 6 in. dia. maple |

7. Prior to importing text files into MicroStation, the font must be set to DESV8FONT, height must be set to 12, width must be set to 10 and line spacing must be set to 1.2 in the MicroStation-Element-Text Styles Dialog Box. Also, in the same dialog box, single line and multi-line justification must be set to left center. Text Node must be turned off.

8. A MicroStation file must be saved and submitted with the appropriate control point, benchmark and witness data. This file must be named (JN)xxxxxwit.dgn. An example is available on the MDOT FTP site.

ATTACHMENT "B"

MDOT QA/QC CERTIFICATION CHECK LIST March, 2006

NOTE : Be sure that the latest CAiCE files and Tugboat from the MDOT FTP site are utilized. Be sure that the latest PDF requirement has been accomplished. Failure to complete and include this list with the final project portfolio will result in the immediate return of the portfolio for completion. An explanation must be included in the Comments section below whenever an item is checked as N/A.

In order to reduce paper and speed the retrieval of information, the MDOT Design Survey Unit is making a conscious effort to move to a "paperless portfolio" as much as possible. Given the nature of our industry, some paper will still need to be provided for legal reasons. See the section "Portfolio and CD Contents" in the Standards of Practice dated March 2006. One portfolio and three CDs are required.

The survey submittal shall be contained in 10" by 12" divided portfolios with flap covers. Use as many portfolios as necessary to contain all the required papers and CDs. Each portfolio shall be labeled on the outside as follows:

SURVEY NOTES FOR:

Structure number <u>B01</u>	Survey Order <u>9092</u>	
CONTROL SECTION <u>99999</u>	JOB NUMBER <u>99999C</u>	ROUTE <u>M-99</u>
LOCATION AND PROJECT LIMITS		DATE
BY <u>Organization</u>	SURVEYOR <u>John J. Doe</u>	LICENSE # <u>12345</u>

Sections in the portfolios shall be labeled as to the type of data contained in that section. A portfolio may contain several types of data but no section of the portfolio should contain more than a single type. Every sheet in each portfolio shall be marked with Control Section, Job Number, Section and Page Number. Compact Disks (CD's) shall be labeled with Control Section, Job Number and Date of the latest revision.

There are six general types or sections (ADMINISTRATION, CONTROL, ALIGNMENT, PROPERTY, MAPPING, MISCELLANEOUS) of information obtained in each of the four categories (ROAD DESIGN SURVEY, PPMS TASK 3330; STRUCTURE SURVEY, PPMS TASK 3340; HYDRAULIS SURVEY, PPMS TASK 3350; ROW SURVEY, PPMS TASK 4510) for a deliverable MDOT Design survey. A separate checklist for Photogrammetric Tasks exists on the FTP site and shall be used for this category. When the survey is completed, the notes are assembled in a portfolio for hard copy record and on a CD or DVD to submit to a design squad arranged in "sections" or folders in the following order:

Yes	No	N/A	Administration
			Table of Contents – should appear bookmarked on the left side of the Adobe screen
			MDOT form 222 (5/01) Survey Notes Receipt and Transmittal, signed
			MDOT Survey Contact Person is : _____
			QA/QC Certification, signed and sealed by the Lead QA/QC person (See the Survey Standards of Practice Quality Assurance/Quality Control section.)
			MDOT QA/QC Certification Check list filled out, signed and sealed
			Original Survey Scope
			Price Proposal
			Notice to Proceed (MDOT Authorization)
			Copy of all work permits required for the project
			Complete synopsis in a Surveyors Project Report of the survey containing
			Explanation of any deviation from the Scope and/or the Standards
			Basis of horizontal and vertical control, with specific emphasis on datum sources used (CORS and NAVD benchmarks tied), equipment, software, methods used to establish the components and errors detected and methods used to eliminate them
			Legal, survey or construction alignment, information and method used to compute its location
			Property issues addressed, with specific information that may be useful for a surveyor to retrace or an engineer during design. If necessary, refer to specific conversations with property owners and their concerns
			Any mapping issues encountered, with specific information that may be useful for an engineer during design
			Any information obtained regarding drainage issues reported by local authorities or residents should be discussed
			If RTK is used, explain the methodology, equipment and procedure used. Include any station names of any NGS control monuments used, or other points with geodetic and State Plane coordinates
			Discuss the contents of anything that appears in the Miscellaneous section. Also address any concerns, concepts or ideas for MDOT improvement of survey services
			Minutes of Meetings, phone conversations, emails, and project correspondence
			An Adobe PDF named JNxxxxxTaskxxxx.pdf with all of the contents of the portfolio scanned into it and bookmarked for ease of location on the CD version
			The CD(s) or DVD(s)

Comments:

Yes	No	N/A	Control
			Research materials and information related to horizontal and vertical control
			Notes for all instrument testing, with dates and instrument numbers
			Electronic raw data files for all horizontal control establishment to be contained in subfolders titled “Horizontal Raw” <ul style="list-style-type: none"> • GPS raw data • Total station raw data • GPS raw data converted to Rinex format
			Electronic raw data files for all vertical control establishment to be contained in subfolders titled “Vertical Raw”
			Plot(s) of the GPS network(s) from GPS processing software
			Calculations for horizontal adjustments including input parameters, raw unadjusted closures, final constrained adjustments, and final coordinates with standard deviations with vector input data and analysis. Include the name of the adjustment program used with version or release, or supply all written calculations to support the final results
			Calculations for vertical adjustments including input parameters, raw unadjusted closures, final constrained adjustments, and final elevations with standard deviations. Include the name of the adjustment program used, or supply all written calculations to support the final results
			Horizontal and vertical datums, ellipsoid, and SPC zone used in adjustment and units (international feet).
			Geoid model used _____
			“a priori” scalar and weighting strategy discussed for each adjustment
			95% confidence values selected
			Centering error and height error settings
			Precise or broadcast ephemeris settings described
			Only Non-trivial vectors used
			Summary of processed GPS vectors
			Individual reports of each GPS vector processed
			Minimal-constrained adjustments – includes all possible report options such as histograms, error ellipses, loop closures, adjusted coordinates, residuals, and statistical tests
			Fully-constrained adjustments - includes all possible report options such as histograms, error ellipses, loop closures, adjusted coordinates, residuals, and statistical tests
			Separate adjustment of main project control verifies coordinate values and positions intended to base rest of project on. Include

			adjustment and report.
			Comparison report showing coordinates of control established/checked from various methods including NGS published values, OPUS derived values, GPS RTK values, project adjusted values, and listing NGS class(A-order, B-order, etc.) if applicable.
			Reports detailing the horizontal and vertical reference systems established for the survey and a list of control stations used for the initial locations
			A list of all horizontal control points with the Northing, Easting, Elevation, standard deviation, and scale factor in each coordinate, material of the monument, station and offset and witnesses. The header should outline the company name, month and year of point establishment, datum, geoid used, SPC zone, and the formula to convert from grid to ground coordinates
			An ASCII file named JNxxxxxHC.txt with all horizontal control points and any government corners with witnesses for all points located in the same coordinate system on the CD version
			A list of all vertical control points with the elevation, description, station and offset, and witnesses. The header should outline the company name, month and year of benchmark establishment and specify the NAVD88 datum. Include all observed benchmarks noting which points were fixed
			An ASCII file named JNxxxxxVC.txt with all vertical control including benchmarks set on the CD version
			If a mark is used in multiple lists, such as a control point and a bench mark, it shall carry the same designation in each. All lists shall include the mark name or number, description of the monument, station and offset, and coordinates
			Include a table of GPS grid and EDM ground observations for Primary Control as described in the Standards of Practice
			Sketch or plot of network or traverse from CAiCE
			NGS Mark Recovery Form

Comments:

Yes	No	N/A	OPUS Requirements
			Observation Procedures per Appendix D of the Standards of Practice were adhered to
			Deliverables per Appendix D of the Standards of Practice are included
			The raw data file(s) from the GPS receiver(s) in its native format and the RINEX converted file must be submitted
			The RINEX files for the MSRN stations used by OPUS must also be provided, these files are available from www.mdotcors.org
			All of the files must be submitted in electronic format; in addition a hard copy of the OPUS output and the observation sheet must be submitted
			Solutions are not to be used for Ellipsoidal heights unless 3 independent observations of 5.5 hour sessions are employed
			For groups of control points spaced less than 1500 feet apart, the following procedures shall be followed <ul style="list-style-type: none"> • All of the points may be submitted to OPUS • The baselines between the groups of points shall be calculated using conventional post processing techniques, using the OPUS derived values as a check
			All Other positioning and monumentation requirements as specified by the MDOT survey manual remain in effect
			An independent manual conversion of the metric SPC to international feet must be made and compared to the OPUS computation

Note: This information shall be contained in the Control Section of the portfolio

Comments:

Yes	No	N/A	Alignment
			<p>All references used to establish alignment which should include at a minimum</p> <ul style="list-style-type: none"> • MDOT survey records • MDOT deeds, ROW releases, and adjacent private land owner deeds • PLSS corners noted on the ROW sheet(s) • Measured roadway data • Field notes • Calculations used to determine the alignment
			Alignment geometry chain Feature Code is SCL
			Alignment sketch with point numbers of the point of beginning, points of intersect, points of curvature and tangency, point of ending, complete curve data (delta angle, radius, external, tangent length, PC station, PI station and PT station) with stationing of all points of intersect and station equations.
			Alignment sketch will contain a note indicating the type of alignment that is being displayed based on the Alignment definitions described in the Standards of Practice
			Alignment sketch will have a statement depicting which alignment was retraced as described in the Alignment section of the Standards of Practice
			Each sheet of the alignment sketches must be certified, signed and sealed by the Professional Surveyor as described in the Alignment section of the Standards of Practice and must appear in the hard copy in the portfolio
			An ASCII file named JNxxxxxALI.txt containing the Point name, Northing, Easting, Station, Description, Witnesses, note whether Set or Found, and curve data for all alignment points. Multiple alignments can be in the same file with the name of the alignment preceding the information.
			The header for the Alignment text file should outline the company name, month and year of point establishment, datum, and the source of the stationing.
			Describe Alignment Chain report named JNxxxxxALI.rep from CAiCE

Comments:

Yes	No	N/A	Property
			Copies of any descriptions used for right of way determination
			Government corner LCRC information
			Copies of recorded plats adjacent to the project
			Copies of any certified surveys in the project area
			Copies of unrecorded surveys obtained from local surveyors along the project
			Tax maps
			Tax descriptions of adjacent properties
			Evidence of other surveys found in the field
			Calculations for alignment and how it fits within a section
			Drawing or sketch showing the bearing and distance between adjacent PLSS corners, the distance from the corners to the alignment and the location and point designation for any found irons (specify the alignment type on the drawing or sketch). It may be necessary to generate more than one plot to convey all the information in a legible manner.
			ASCII text file named JNxxxxxPROP.txt with feature designation, station and offset, and coordinates for any irons found or set
			ASCII text file named JNxxxxxPLSS.txt with feature designation, station and offset, coordinates and witnesses for all government corners

Comments:

Yes	No	N/A	Mapping
			Survey research related to project mapping – examples include old MDOT plans, etc
			Measurements in the form of data collector contents, both edited and unedited, and scanned copies of written field notes on the CD version
			Electronic raw data files for all mapping to be contained in a subfolder titled “Mapping Raw”
			Calculations
			Planimetric map of the project area generated from the MDOT (CAiCE) Plans Production Tugboat – Named with Job number and phase per the following examples: <ul style="list-style-type: none"> • Road Project - “12345C_PL.DGN • Structure Project – 12345D_PL.DGN • EPE Project – 123450_PL.DGN
			Drainage structure inventory report in spreadsheet format compatible with MDOT software and correlated to the CAiCE File
			Connectivity plot of all utility and drainage features – more than one plot may be required to convey all the information
			Utility plans if required
			Utility company listing to include company name, address, phone number, and contact person
			Underground utility data if required
			Individual utility / drainage station and offset reports generated by feature code in CAiCE with the file name “Feature code.rep” ex: Catch Basin.rep
			Plans and maps obtained from local agencies
			CAiCE zip file on the CD version which will include: <ul style="list-style-type: none"> • Survey chains edited for aesthetics • Crossing survey chains resolved • DTM created and edited • Contours
			Final drawing plots with certification, signature and seal of the Professional Surveyor must be included in the hard copy portfolio

			<p>MicroStation files on the CD version and a scanned image in the PDF. The following DGN files will be included:</p> <ul style="list-style-type: none"> • 2d planimetric which can be produced by running the MDOT Plans Production tugboat • Control dgn which will include the following: <ul style="list-style-type: none"> • Control Point list per Appendix ASC • Bench Mark list per Appendix ASC • PLSS Corner list per Appendix ASC if existing • Alignment Point list per Appendix ASC if existing
			<p>GeoPak files on the CD version in a subfolder titled Geopak. The following files will be included:</p> <ul style="list-style-type: none"> • 3d triangle file • KCP file • OBS file • XYZ file • ALI file <p>This can be accomplished by running the MDOT Plans Production tugboat</p>

Comments:

Yes	No	N/A	Laser Scanning Requirements
			A network diagram showing the location and label of each control target
			At least four hard surface check observations need to exist per scan with overlap. The observations do not need to be on a given line, and can reside on a PAVED shoulder. The check observations need to reside in CAiCE and not be part of the DTM. Elevations should be within 0.05 feet of the calculated DTM
			Control points used for scan targets must be marked in the field with an 18" long #4 rebar rod with a plastic cap labeling it as SCAN CONTROL
			A copy of each scan must be provided on CDs, DVDs or high-speed peripheral devices, and presented in a 3-ring binder with plastic pocketed sheets for easy retrieval. Each CD will be labeled with the Job Number and scan designations
			A report needs to be compiled listing the scan designation and the number of control targets used in the scan for proper location on the diagram
			A statement in the Surveyors Report identifying the type of equipment used and a discussion of scanner tolerance and resulting data tolerance for the survey
			Comparison Spreadsheet showing resulting data coordinates from the scan, check observation coordinates and the coordinate differences. The high and low tolerances shall be shown
			Scan data shall be exported/imported into a format that may be used to import data into CAiCE to prepare the DTM surface
			The Surveyor's Report must outline targeting, merging and registration of the scans, geo-referencing, QA/QC checks and the import into CAiCE

Comments:

Yes	No	N/A	Structure Specific Information
			Sketch of structure in elevation view with the following information displayed: <ul style="list-style-type: none"> • Reference Line to Reference Line dimension • Abutment elevations • Bridge Seat elevations • Pier cap elevations if existing • Footing elevations (if required) • Face to Face Abutment and Pier (if existing) dimensions • Top of water and water course bed elevation or lower road elevation
			Sketch of structure in plan view with the following information displayed: <ul style="list-style-type: none"> • Reference Point coordinates to include elevation and station • Alignment(s) • Angle of crossing • Deck survey chain • Abutment survey chains • Wing wall survey chains if existing • Pier cap dimensions
			Explanation of how the Reference Point locations were determined in the Surveyors Report

Comments:

Yes	No	N/A	CAiCE File
			The desired plot scale has been determined
			Project Name is the MDOT Job Number
			CAiCE Project Description field is filled out
			System Settings dialog box set up: Correct Units (International feet), Correct Horizontal and Vertical Datums, Z coordinate value set to 4.2
			Contour Interval set to 2 in DTM Settings
			Max. Offset for contour smoothing set to 1 in DTM Settings
			Correct MDOT Feature Table and Cell Library attached prior to data importation
			Only MDOT Feature Codes Used per the October 2005 table
			All points have appropriate description
			All Survey Chains are edited; properly connected; patterns checked for proper direction, correctness, and aesthetics
			All Survey Chain crossings resolved
			No Survey Chain curves are shown as chords
			Hydro Survey Chains (if required) checked for correct left to right direction
			DTM surface names will adhere to the following Naming conventions: <ul style="list-style-type: none"> • Road Project – EXRD, EXRD1, EXRD2, etc for multiple surfaces • Structure Project – EXBRG, EXBRG1, EXBRG2 • Bridge Deck surface if requested - EXDECK, EXDECK1, EXDECK2 • Photo Mapping – EXPHO, EXPHO1, EXPHO2 • Supplemental Photo Survey – EXSUP, EXSUP1, EXSUP2 • Photo / Supplemental Merged – EXMERG, EXMERG1, EXMERG2
			DTM checked for invalid break lines and point data
			DTM triangles checked for spikes and dips
			Long or invalid triangles have been obscured from Tin
			Contours created based on the following object display settings: <ul style="list-style-type: none"> • Contour interval set to 2 regular and 10 index • All contour colors set to 5, Index set to 2 • Line weights set to 0 regular, 1 Index • All contour levels set to 75 • Index Label spacing set to 60, color set to 5 • Character height is dependent on the scale <ul style="list-style-type: none"> ◆ 100 scale, character height = 9.0 ◆ 50 scale, character height = 4.5 ◆ 40 scale, character height = 3.6 • Label Depression Contours unchecked • Final contours computed after DTM edits and settings checked
			Bridge Deck removed from DTM
			Water course removed from DTM
			Terrain surface beneath bridge decks is included in DTM
			Text size is set to the correct scale: 100 scale = 9.0 text size 50 scale = 4.5 text size

			40 scale = 3.6 text size
			Cell scale is correctly set: 1.0 = 1" : 100' 0.5 = 1" : 50' 0.4 = 1" : 40'
			All overlapping text has been resolved
			MDOT's Plan Production Tugboat / Macro used to produce the required Microstation drawing and Geopak files
			Create one Microstation drawing containing the following information: Control point list, Benchmark list, Alignment point list, and Government corner list per Appendix ASC of the Standards of Practice
			CAiCE archive file named the Job number and created from CAiCE

Comments:

Yes	No	N/A	Miscellaneous
			Data not assignable to one of the other five sections may be placed here. Photos, newspaper articles, etc. would be examples of appropriate information. The surveyor's project report should specify any items included here
			Clean up of project area: ie- removal of lathe, etc.

Comments:

Yes No Scope has been reviewed to insure compliance. (Circle one)

I have reviewed the survey notes and scope of work and certify that all required and requested information is contained in the portfolio and on the CD or DVD and is in compliance with the MDOT Survey Standards of Practice, the survey scope of work and this QA/QC Check List. Any information omitted from this submission has been explained in the Comments area below each section.

SEAL

Professional Surveyor signature

ATTACHMENT “C”

MDOT REQUEST FOR CONSULTANT SURVEY SERVICES

April 18, 2006

Consultant Firm Name
Attn: Contact, P.S.
Address 1
Address 2

MDOT requests consultant survey staff and services for the following project under the contract number 2004-0139 (3), Scope of Services for Consultants “As Needed” Design Survey Services for Lansing Design Support Area Survey Unit.

JOB NUMBER: ##### CONTROL SECTION: #####

ROUTE: US-31 at Buchanan Rd., Lincoln Rd., and Waverly Rd., Ottawa County, Michigan.

TYPE OF SURVEY: Road Design Survey; P/PMS Task 3330
Hydraulic Survey; P/PMS Task 3350

PROJECT DESCRIPTION:

Establish horizontal and vertical control (SPCS - NAD83, NAVD88) and map the following areas:

Buchanan & Lincoln – R/W to R/W for a distance of 1000 feet north and south of cross-road. Include the railroad on the west side of US-31 and its associated ditches and drainage for the entire length. Cross-sections required at 50 ft. intervals for DTM.

Waverly – SB outside edge of metal to NB outside edge of metal for a distance of 600 feet north and south of cross-road. Survey info for Waverly is needed in the median only between US-31. No survey data is required east or west of US-31 along Waverly Rd. Cross-sections required at 50 ft. intervals.

Provide all utility info including pipe invert elevations, size, material, etc...

Alignment: LEGAL based on deeds, old plans, and R/W Book.

PROJECT DELIVERABLES:

- Fully edited CAiCE archive file (#####C.zip) with DTM, MicroStation V8 files, raw ASCII e-files, field notes, check shot reports, and supporting documentation.
- Horizontal & vertical least squares adjustment with statistical information reported at the 95% (2-sigma) confidence level.
- Survey report discussing the project control, survey equipment used, procedures, problems, survey checks, and consultant staff that worked on the project.

- Control Point and Benchmark list for any control established by the Consultant.

PROJECT DUE DATE: 4 WEEKS after final work authorization is issued.

Receipt of this request requires the Consultant to notify the undersigned regarding the availability of the Consultant's staff to work on this project and acceptance of the above terms and conditions in writing within two working days. A detailed cost proposal with a breakdown of man hours and tasks will be required and reviewed prior to obtaining a final work authorization.

Thomas Benson, P.S.
Lansing Survey Project Manager
FAX: 517-241-4631

Consultant Surveyor
Title, Firm, Date